

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (currently amended): An electromagnetic contactor for ~~performing switching of opening or closing~~ a contact by controlling energization of an electromagnet to move a movable core from a first position to a second position with respect to a fixed core, the electromagnetic contactor comprising:

attraction force control means for controlling an integral value of a current flowing through the electromagnet for a predetermined time so that ~~acceleration-velocity~~ in the second position of the movable core becomes zero;

wherein said attraction force control means contains switches and timers operable to pass current through said electromagnet only during said predetermined time;

wherein said predetermined time is less than a time needed for said movable core to move from said first position to said second position; and

wherein said attraction force control means prevents current from passing through said electromagnet after said predetermined time until said movable core reaches said second position.

2. (currently amended): An electromagnetic contactor for passing a current through an electromagnet from a power source and moving a movable core from a first position in which a

gap to a fixed core is wide to a second position in which the gap is narrow by electromagnetic force and opening or closing a contact, the electromagnetic contactor comprising:

attraction force control means for passing a first current through the electromagnet for a predetermined time so that ~~acceleration~~velocity in the second position of the movable core becomes zero and passing a second current through the electromagnet ~~in substantially~~when said movable core reaches the second position,

wherein said predetermined time is less than a time needed for said movable core to move from said first position to said second position; and

wherein said attraction force control means passes the second current to attract and hold said electromagnet after said predetermined time when said movable core reaches said second position.

3. (currently amended): An electromagnetic contactor for breaking a current flowing through an electromagnet from a power source and moving a movable core from a second position in which a gap to a fixed core is narrow to a first position in which the gap is wide and opening or closing a contact, the electromagnetic contactor comprising:

attraction force control means for breaking the current flowing through the electromagnet and then passing a deceleration current through the electromagnet for a second predetermined time after a first predetermined time so that ~~acceleration~~velocity in the first position of the movable core becomes zero; and

wherein said first predetermined time is less than a time needed for said movable core to move from said second position to said first position; and

wherein said attraction force control means passes the current through said electromagnet for the second predetermined time after said first predetermined time until said movable core is substantially in said first position.

4. (currently amended): An electromagnetic contactor for passing a current through an electromagnet from a power source and moving a movable core from a first position in which a gap to a fixed core is wide to a second position in which the gap is narrow by electromagnetic force and opening or closing a contact, the electromagnetic contactor comprising:

current control means for controlling the current flowing through the electromagnet; and

command means for passing a first current through the electromagnet for a predetermined time by the current control means so that ~~acceleration~~ velocity in the second position of the movable core becomes zero ~~to break the current~~, and then passing a second current through the electromagnet by the current control ~~the at the time~~ means when the movable core ~~moves to~~ substantially reaches the second position ~~after a lapse of a predetermined time; and~~

wherein said predetermined time is less than a time needed for said movable core to move from said first position to said second position; and

wherein said current control means prevents current from passing through said electromagnet after said predetermined time until said movable core is substantially in said second position.

5. (currently amended): An electromagnetic contactor for breaking a current flowing through an electromagnet from a power source and moving a movable core from a second position in which a gap to a fixed core is narrow to a first position in which the gap is wide and opening or closing a contact, the electromagnetic contactor comprising:

current control means for controlling the current flowing through the electromagnet; and
command means for breaking the current flowing through the electromagnet by the current control means, then passing a deceleration current through the electromagnet for a predetermined time by the current control means after a predetermined ~~time~~ lapse so that ~~acceleration~~ velocity in the first position of the movable core becomes zero, and then breaking the deceleration current by the current control means at the time when the movable core moves to substantially the first position; and

wherein said predetermined time is less than a time needed for said movable core to move from said second position to said first position.

6. (currently amended): The electromagnetic contactor as defined in claim 2 ~~or 4~~, wherein ~~after passing a current higher than~~ said second current is greater than a holding current value

necessary to hold the movable core in the second position ~~through the electromagnet for a predetermined time by the current control means~~during an initial predetermined time, and

wherein said a value of the second current passes is equal to the holding current value
~~through the electromagnet by the current control means~~after the predetermined time.

7. (currently amended): An electromagnetic contactor for passing a current through an electromagnet from a power source and moving a movable core from a first position in which a gap to a fixed core is wide to a second position in which the gap is narrow by electromagnetic force and opening or closing a contact, the electromagnetic contactor comprising:

current control means for controlling the current flowing through the electromagnet; and

command means for passing a first current through the electromagnet for a first predetermined time by the current control means so that ~~acceleration~~velocity of the movable core becomes zero slightly in front of the second position, then passing a second current having a value lower than the first current through the electromagnet for a second predetermined time by the current control means ~~at a point in time~~ when the movable core moves slightly in front of the second position, and then passing a third current through the electromagnet by the current control means at a ~~point in time~~ when the movable core ~~moves to~~reaches the second position;

wherein said command means prevents current flow through the electromagnet after said first predetermined time and before said second current passes.

8. (currently amended): An electromagnetic contactor for breaking a current flowing through an electromagnet from a power source and moving a movable core from a second position in which a gap to a fixed core is narrow to a first position in which the gap is wide and opening or closing a contact, the electromagnetic

contactor comprising

current control means for controlling the current flowing through the electromagnet; and

command means for breaking the current flowing through the electromagnet by the current control means, then passing a first deceleration current through the electromagnet for a first predetermined time by the current control means after a first lapse of a predetermined time so that ~~acceleration~~ velocity of the movable core becomes zero slightly in front of the first position ~~of the movable core~~, passing a second deceleration current for a second predetermined time by the current control means at a ~~point in~~ time when the movable core ~~is~~ moves to slightly in front of the first position, and then breaking the second deceleration current by the current control means at a ~~point in~~ time when the movable core ~~moves to~~ reaches the first position; and

wherein said command means prevents current flow through the electromagnet after the current control means breaks the current flowing through the electromagnet and before said first deceleration current passes.

9. (currently amended): The electromagnetic contactor as claimed in any of claims 4-8 or 14, wherein a command of the command means has a predetermined slope in a rise or a fall of a current.

10. (currently amended): An electromagnetic contactor for passing a current through an electromagnet from an AC power source and moving a movable core from a first position in which a gap to a fixed core is wide to a second position in which the gap is narrow by electromagnetic force and opening or closing a contact, the electromagnetic contactor comprising:

phase control means for shifting the AC power source from OFF to ON at a predetermined voltage phase based on a command from command means; and

command means for turning on the phase control means with a predetermined voltage phase to apply a voltage to the electromagnet for a predetermined time so that ~~acceleration~~ velocity of the movable core becomes zero at the second ~~position~~ position, ~~then turning off the phase control means,~~ and then turning off the phase control means ~~at the time that the movable core reaches the second position~~ after said predetermined time;

wherein said predetermined time is less than a time needed for said movable core to move from said first position to said second position.

11. (currently amended): An electromagnetic contactor for breaking a current through an electromagnet from an AC power source and moving a movable core from a second position in

which a gap to a fixed core is narrow to a first position in which the gap is wide and opening or closing a contact, the electromagnetic contactor comprising:

phase control means for turning on or off the AC voltage applied to the electromagnet;

command means for turning off the phase control means with a predetermined voltage phase, then turning on the phase control means ~~at a position that~~when the movable core is ~~in front of~~slightly before the first position, then applying a voltage ~~during for~~for a predetermined time to the electromagnet so that acceleration of the movable core becomes zero, and then turning off the phase control means; and

wherein said predetermined time is less than a time needed for said movable core to move from said second position to said first position.

12. (currently amended): An electromagnetic contactor for breaking a current flowing through an electromagnet from a power source and moving a movable core from a first position in which a gap to a fixed core is wide to a second position in which the gap is narrow and opening or closing a contact,

wherein the electromagnet comprises a first electromagnet for exciting the fixed core and a second electromagnet for exciting the movable core,

the electromagnetic contactor comprising:

current control means for controlling the current flowing through the first and second electromagnets;

switching means for switching electromagnetic force occurring in the movable core and the fixed core to attraction or repulsion by switching a direction of the current flowing through the first or second electromagnet; and

command means for passing a first attraction current through the first and second electromagnets for a first predetermined time ~~in an attraction direction of the movable core and the fixed core by the current control means and the switching means~~, then passing a first repulsion current through the first and second electromagnets for a second predetermined time ~~in a repulsion direction of the movable core and the fixed core by the current control means and the switching means at a point in time~~ when the movable core approaches the second position, and then passing ~~the~~ a second attraction current through the first and second electromagnets ~~in an attraction direction of the movable core and the fixed core by the current control means and the switching means at a point in time~~ when the movable core moves to the second position.

13. (currently amended): An electromagnetic contactor for breaking a current flowing through an electromagnet from a power source and moving a movable core from a second position in which a gap to a fixed core is narrow to a first position in which the gap is wide and opening or closing a contact,

wherein the electromagnet comprises a first electromagnet for exciting the fixed core and a second electromagnet for exciting the movable core,

the electromagnetic contactor comprising:

switching means for switching electromagnetic force occurring in the movable core and the fixed core to attraction or repulsion by switching a direction of the current flowing through the first or second electromagnet; and

command means for passing a first repulsion current through the first and second electromagnets for a first predetermined time ~~in a repulsion direction of the movable core and the fixed core by the current control means and the switching means~~, then passing a first attraction current through the first and second electromagnets for a second predetermined time ~~in an attraction direction of the movable core and the fixed core by the current control means and the switching means~~, and then breaking the first attraction current ~~at a point in time when the~~ movable core moves to the first position.

14. (new): The electromagnetic contactor as defined in claim 4, wherein said second current is greater than a holding current value necessary to hold the movable core in the second position for an initial predetermined time, and wherein said second current is equal to the holding current value after the predetermined time.